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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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22928	7590	01/26/2004	EXAMINER	
CORNING INCORPORATED			ROSSI, JESSICA	
SP-TI-3-1				
CORNING, NY 14831			ART UNIT	PAPER NUMBER

1733

DATE MAILED: 01/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/035,564	SABIA, ROBERT	
	Examiner	Art Unit	
	Jessica L. Rossi	1733	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12/4/03, Amendment.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6,9-16 and 18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6,9-16 and 18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
 a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>8/4/03</u> | 6) <input type="checkbox"/> Other: |

DETAILED ACTION

Response to Amendment

1. This action is in response to the amendment dated 12/4/03. Claims 7-8, 17, and 19-22 were canceled. Claims 1-6, 10-16, and 18 are pending.
2. The rejection of claim 3 under 35 U.S.C. 102(b) as being anticipated by Eda (of record), as set forth in paragraph 4 of the previous office action, has been withdrawn in light of Applicants arguments presented on p. 4-5. The examiner agrees that one skilled in the art would not know the pH of the ammonia/hydrogen peroxide solution and therefore it would be possible for this solution to not have a high pH.
3. The rejection of claims 16-17 under 35 U.S.C. 103(a) as being unpatentable over Eda in view of Landrock, Shiono et al. (of record), and Vines et al. (of record), as set forth in paragraph 12 of the previous office action, has been withdrawn for the reasons set forth in paragraph 2 above.
4. The rejection of claim 16 under 35 U.S.C. 103(a) as being unpatentable over Abe et al. (of record) in view of Landrock and Vines et al., as set forth in paragraph 16 of the previous office action, has been withdrawn in light of the present amendment to the claim. It is noted that *Abe teaches heating the wafers above 1000°C and therefore teaches away from heating to less than 300°C (column 9, lines 63-65).*
5. The rejection of claim 16 under 35 U.S.C. 103(a) as being unpatentable over Nishimoto et al. (of record) in view of Abe et al. and Landrock, as set forth in paragraph 17 of the previous office action, has been withdrawn in light of the present amendment to the claim. *It is noted that*

Nishimoto teaches away from heating the articles at all during contacting/bonding (column 4, lines 4-9).

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 3-6 and 10-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 3-5, 10, and 14, it is unclear what Applicants mean by "high pH". The present specification gives this terminology more than one interpretation. It can mean the pH is "about 8 to about 13" (p. 5, [00010]) or it can mean the pH is "greater than 8, but less than 14" (p. 6, [00011]). Do Applicants intend the former or latter interpretation for the present claims? Applicants are asked to clarify. It is suggested to amend the present claims to specifically recite the former or latter interpretation. For purposes of action of the merits, the examiner will be giving this terminology its broadest interpretation.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1-2 and 11-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Eda (US 5785874; of record).

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With respect to claim 1, Eda is directed to making an optical waveguide by directly bonding two silicon-containing (glass) substrates 2, 14 (Figure 14). Prior to bonding, the surface of each substrate is cleaned, contacted with an acidic solution (i.e. HF), contacted with an ammonia/hydrogen peroxide solution, and contacted with pure water in this order (column 14, line 63 - column 15, line 10). The reference teaches such a treatment sequence providing hydroxyl groups (-OH) on the surfaces of the substrates (column 15, lines 8-11) and therefore the skilled artisan would have appreciated that these hydroxyl groups would be bonded to the silicon comprising the substrates, thereby forming silanol termination groups (Si-OH) on the surfaces of the substrates.

Regarding claim 2, Eda teaches maintaining the substrates at a temperature less than 300°C during bonding (column 16, lines 1-2).

Regarding claim 11, Eda teaches rinsing the surfaces with pure water and placing them in contact without drying (column 15, lines 8-9 and 22-27).

Regarding claim 12, Eda teaches maintaining the substrates at a temperature less than 300°C during bonding (column 16, lines 1-2).

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

11. Claims 1-3 are rejected under 35 U.S.C. 102(a) as being anticipated by Abe et al. (WO 01/73831; of record; refer to US 6583029 for translation).

**It is noted the present invention provides the claimed termination groups on the surfaces of the silicon-containing articles by treating the surface of each article with an acidic solution*

(i.e. comprising HNO₃, HCl, or H₂SO₄; p. 6, [00011]) followed by a basic solution having a "high pH" (i.e. comprising KOH, NaOH, or NH₄OH; p. 8, [00019]) (see specification, p. 11, [00022] for treatment sequence and termination groups produced).

With respect to claim 1, Abe is directed to treating the surfaces of two silicon wafers 1, 2 and directly bonding them to each other (column 1, lines 7-8; column 4, lines 44-45). The reference teaches contacting the surface of each wafer with an acidic solution comprising HNO₃ (column 5, lines 57-58), followed by contacting the surface of each wafer with a basic solution comprising KOH (column 6, lines 4-6), and finally contacting the treated surfaces of the wafers with each other to bond them together (column 9, lines 50-65).

The examiner acknowledges that the basic solution comprises KOH with colloidal silica (abrasive grains) wherein the skilled artisan would have appreciated that such grains would have a negligible effect on the pH of the solution and therefore the skilled artisan would have appreciated that the basic solution of Abe would have a "high pH". Therefore, since Abe teaches treating the surfaces of the wafers with an acid followed by a basic solution having a high pH, Abe teaches providing at least Si-OH termination groups on opposing surfaces of the wafers.

Regarding claim 2, Abe teaches maintaining the temperature of the opposing surfaces at room temperature during the contacting step (column 9, lines 59-61).

Regarding claim 3, Abe teaches contacting the opposing surfaces with a high pH solution (see previous paragraphs relating to claim 1).

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

13. Claims 1-3, 12, and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by Gwo (US 6548176).

With respect to claim 1, Gwo is directed to treating the surfaces of two silicon-containing 26, 28 (Figure 3A; column 11, lines 59-67) and directly bonding them to each other to make an optical device (Figure 3C; column 20, lines 56-62). The reference teaches treating the opposing surfaces of the articles with a solution, such as KOH or a mixture of NaOH and KOH (column 13, lines 11-15), to provide Si-OH and Si-(OH)₂ termination groups on the surfaces of each wafer (Figure 3B), and placing the opposing surfaces in contact with each other to bond them together (Figure 3C; column 8, lines 59-66; column 9, lines 11-24).

Regarding claim 2, the reference teaches maintaining the surfaces at a temperature below 300°C during the contacting step (column 9, lines 57-62).

Regarding claim 3, the reference teaches contacting the surfaces with a high pH solution (column 13, lines 11-15).

Regarding claim 12, the reference teaches heating the articles to a temperature less than 300°C during the contacting step (column 9, lines 57-62).

Regarding claim 15, the reference teaches the articles being lenses (column 20, lines 57-62).

Claim Rejections - 35 USC § 103

14. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

15. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eda and further in view of Gwo.

Regarding claim 13, Applicants are directed to paragraph 9 above for a complete discussion of Eda. It would have been obvious to bond the glass substrates of Eda using pressure because such is known in the art, as taught by Gwo (column 24, lines 47-65), wherein such expedites the bonding process.

16. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eda.

Regarding claim 15, Applicants are directed to paragraph 9 above for a complete discussion of Eda. Eda teaches one of the substrates being a waveguide (column 15, lines 13-14) but is silent as to the other glass substrate being one of the articles claimed in the present invention. It would have been obvious to have the other glass substrate be a waveguide because the skilled artisan would have appreciated that optical waveguide devices are made by bonding a plurality of waveguides together.

17. Claims 4 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al. and further in view of Landrock (Adhesives Technology Handbook; of record).

Regarding claim 4, Applicants are directed to paragraph 11 above for a complete discussion of Abe. Abe teaches contacting the wafer surfaces with HNO₃ before contacting them with the KOH solution but is silent as to cleaning them with a detergent before contacting them with the KOH.

It is known to clean the surfaces of two silicon-containing substrates with a detergent prior to treating the same with an acidic solution to facilitate bonding between the substrates, as taught by Landrock (p. 117-118). Therefore, since Abe teaches treating the wafer surfaces with the acid before treating them with the high pH solution, it would have been obvious to the skilled artisan to clean the surfaces of the wafers of Abe with a detergent before treating them with the high pH solution because such a cleaning agent is known in the art, as taught by Landrock, and this would remove any contaminants from the surfaces that could interfere with subsequent treating and bonding steps.

Regarding claim 9, Abe teaches the acid including HNO_3 (see paragraph 11 above).

Regarding claim 10, Abe teaches the basic solution containing potassium hydroxide (KOH ; see paragraph 10 above).

18. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al. and further in view of Namba et al. (US 5698471).

Regarding claim 11, Applicants are directed to paragraph 11 above for a complete discussion of Abe. Abe is silent as to rinsing the surfaces with water and placing them into contact without drying. It is known in the silicon wafer bonding art to treat opposing wafer surfaces with an acidic solution followed by another solution and then rinse the opposing surfaces with deionized water before placing them into contact without drying, as taught by Namba (column 4, lines 50-65).

It would have been obvious to the skilled artisan at the time the invention was made to rinse the opposing surfaces of the wafers of Abe with water and place them into contact without

drying because such is known in the art, as taught by Namba, wherein such rinsing would remove any contaminants from the surfaces that could interfere with bonding.

19. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al. and further in view of Ramsey et al. (US 6129854; of record).

Regarding claim 13, Applicants are directed to paragraph 11 above for a complete discussion of Abe. Abe is silent as to applying pressure of at least 1 lb/in² during the contacting step. It is known in the art to chemically treat opposing surfaces of two silicon wafers and apply pressure of at least 1 lb/in² during contacting of the same, as taught by Ramsey (column 6, lines 15-22; note 10 kg/cm² = 142 lb/in²).

It would have been obvious to the skilled artisan at the time the invention was made to apply pressure of at least 1 lb/in² during the contacting step of Abe because such is known in the art, as taught by Ramsey, and this would aid in bonding of the wafers.

20. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al. and Landrock as applied to claim 4 above, and further in view of Namba et al. and Ramsey et al.

Regarding claim 14, Abe is silent as to rinsing the opposing wafer surfaces with water, subsequently drying the surfaces to remove absorbed water molecules therefrom, and using low pressure vacuum during the contacting step, wherein all of this takes place after contacting the surfaces with the acid and high pH solution.

As for rinsing the surfaces with water, Applicants are invited to reread the rejection set forth in paragraph 18 above.

As for drying the surfaces, Abe teaches heating the wafers to promote bonding between the same (column 9, lines 62-65), wherein the skilled artisan would have appreciated that such heating would remove adsorbed water molecules from the surfaces of the wafers.

As for using vacuum, it is known in the art to chemically treat opposing surfaces of two silicon wafers and apply low pressure vacuum during contacting of the same, as taught by Ramsey (column 6, lines 18-22). It would have been obvious to the skilled artisan at the time the invention was made to use low pressure vacuum during the contacting step of Abe because such is known in the art, as taught by Ramsey, wherein only the expected results of preventing air gaps would have been achieved and therefore good bonding would result.

21. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gwo and further in view of Eda (US 5785874; of record).

Regarding claim 11, Applicants are directed to paragraph 13 above for a complete discussion of Gwo. Gwo is silent as to rinsing the surfaces with water and placing them into contact without drying.

It is known in the art to make optical devices by chemically treating opposing surfaces of two silicon-containing articles followed by rinsing the surfaces with water and then contacting the same without drying, as taught by Eda (column 5, line 20; column 15, lines 1-4 and 13-33). Therefore, it would have been obvious to the skilled artisan to rinse the chemically treated surfaces of Gwo with water and contact them without drying because such is known in the art, as taught by Eda, wherein rinsing cleans the articles thereby removing any contaminants that might interfere with the contacting step.

22. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gwo.

Regarding claim 13, Applicants are directed to paragraph 13 above for a complete discussion of Gwo. Gwo teaches applying low pressure during the contacting step (column 24, lines 47-61). Selection of a particular pressure would have been within purview of the skilled artisan at the time the invention was made wherein the skilled artisan would have appreciated that 1 lb/in² could be considered "low pressure."

Double Patenting

23. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

24. Claims 1, 3-6, 9-11, 13, and 15 are provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1, 3-6, 9-11, 13, and 15 of copending Application No. 10/255,926. This is a provisional double patenting rejection since the conflicting claims have not in fact been patented.

With respect to claim 1 of the present application, the examiner points out that Markush language is alternative language only requiring at least one of the listed groups (see MPEP 2173.05(h)). Therefore, statutory provisional double patenting exists between the applications for the three termination groups that are identical in both the present and copending applications.

25. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed.

Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

26. Claims 1, 2, 12, 16, and 18 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 2, 12, and 16-18 of copending Application No. 10/255,926 in view of Gwo.

With respect to claim 1, claim 1 of the copending application teaches Si-(OH)₂, Si-(OH)₃, and O-Si-(OH)₃ termination groups but does not teach an Si-OH group. However, it would have been obvious to alternatively provide an Si-OH termination group on the surfaces of the copending application because such is known in the art, as taught by Gwo (see paragraph 11 above), wherein such termination groups allow for the formation of siloxane bridges (Si-O-Si) between the two surfaces during bonding.

Regarding claims 2 and 12, claims 2 and 12 of the copending application teach all the limitations except a temperature greater than 200°C and less than 300°C. It would have been obvious to include such a range in the possible range of temperatures claimed by the copending application because such is known in the art, as taught by Gwo (column 9, lines 57-62), wherein increased temperatures would expedite bonding.

With respect to claim 16, claims 16-17 of the copending application teach all the limitations except heating the surfaces to a temperature greater than 200°C but less than 300°C. It would have been obvious to include such a range in the possible range of temperatures claimed

in the copending application because such is known in the art, as taught by Gwo (column 9, lines 57-62), wherein increased temperatures would expedite bonding.

Regarding claim 18, claim 18 of the copending application teaches these limitations.

This is a provisional obviousness-type double patenting rejection.

27. Claim 14 is provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 4 and 14 of copending Application No. 10/255,926 in view of Eda and Gwo.

Regarding claim 14, claim 14 of the copending application teaches all the limitations except rinsing with water, drying, and applying vacuum. It would have been obvious to the skilled artisan to rinse the chemically treated surfaces of the copending application with water and dry the treated surfaces (by heating) because such is known in the art, as taught by Eda (column 15, lines 12-32; column 16, lines 1-5), wherein rinsing cleans the surfaces and drying removes adsorbed water molecules thereby creating covalent bonds between the surfaces (Eda; column 15, lines 18-28). It would have been obvious to apply vacuum during the contacting step because such is known in the art, as taught by Gwo (column 24, lines 55-65), wherein only the expected results of preventing air gaps between the surfaces would have been prevented and therefore good bonding would result.

This is a provisional obviousness-type double patenting rejection.

28. Claims 16 and 18 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 10 of copending Application No. 10/255,926 in view of Eda.

With respect to claim 16, claim 10 of the copending application teaches all the limitations except polishing, contacting the surfaces with an aqueous rinse, and heating to a temperature less than 300°C.

It would have been obvious to polish the articles because such a technique is well-known in the art for improving the appearance and performance of the finished product. It would have been obvious to contact the surfaces with an aqueous rinse (i.e. water) because such is known in the art, as taught by Eda (column 15, lines 8-11), wherein this also removes any contaminants. It would have been obvious to heat to a temperature below 300°C during the contacting step because such is known in the art, as taught by Eda (column 16, lines 1-5), wherein this removes hydroxyl group from the surfaces to form covalent bonds between the same (Eda; column 15, lines 30-34).

Regarding claim 18, it would have been obvious to apply pressure during contacting because such is a well-known and conventional technique for expediting the bonding process. Selection of a particular pressure would have been within purview of the skilled artisan.

This is a provisional obviousness-type double patenting rejection.

29. Claims 16 and 18 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 10 of copending Application No. 10/255,926 in view of Gwo.

With respect to claim 16, claim 10 of the copending application teaches Si-(OH)₂, Si-(OH)₃, and O-Si-(OH)₃ termination groups but does not teach an Si-OH group. However, it would have been obvious to alternatively provide an Si-OH termination group on the surfaces of the copending application because such is known in the art, as taught by Gwo (see paragraph 11

above), wherein such termination groups allow for the formation of siloxane bridges (Si-O-Si) between the two surfaces during bonding.

Regarding claim 18, see previous paragraph.

This is a provisional obviousness-type double patenting rejection.

30. Claims 1-3, 12-13, and 15 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 8, 26, and 38 of copending Application No. 10/035,358 in view of Eda and Gwo.

*It is noted this rejection is based upon the originally filed claims of copending application 10/035,358 because even though an amendment was filed after mailing of the previous office action, this amendment is not available to the examiner as of yet. When the amendment does become available, the rejection will be reconsidered accordingly.

With respect to claims 1, 3, and 15, claims 8, 26, and 38 of the copending application teach all the limitations except the optical waveguide and optical article/lens being silicon-containing articles. It would have been obvious to use an optical waveguide and an optical article/lens containing silicon because such is known in the art, as taught by the collective teachings of Eda and Gwo (see paragraphs 12 and 18 above), wherein such materials lend themselves to direct bonding via chemical surface treatment.

Regarding claims 2 and 12, it would have been obvious to contact the surfaces at a temperature below 300°C because such is known in the art, as taught by the collective teachings of Eda (column 16, lines 1-5) and Gwo (column 9, lines 57-63), wherein such temperatures are less likely to degrade the articles.

Regarding claim 13, it would have been obvious to apply pressure during the contacting step because such is known in the art, as taught by Gwo, wherein such facilitates bonding. Selection of a particular amount would have been within purview of the skilled artisan.

This is a provisional obviousness-type double patenting rejection.

31. Claims 16 and 18 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 18 and 44 of copending Application No. 10/035,358 in view of Eda, Landrock, and Plobl et al. ("Wafer Direct Bonding"; provided in IDS).

Regarding claim 16, claim 18 and 44 of the copending application teach all the limitations except the optical articles containing silicon, polishing, contacting with detergent, contacting with an aqueous rinse solution, the acid being HNO₃, and heating to less than 300°C.

It would have been obvious to the skilled artisan to use silicon-containing optical articles because such is known in the art, as taught by Eda (column 14, line 59-67; column 15, lines 13-14). It would have been obvious to polish the articles because such a technique is well-known in the art for improving the appearance and performance of the finished product. It would have been obvious to contact the surfaces with a detergent because such is known in the art of chemically treating silicon-containing articles, as taught by Landrock (see paragraph 13 above), wherein such cleansing removes contaminants. It would have been obvious to contact the surfaces with an aqueous rinse (i.e. water) because such is known in the art, as taught by Eda, wherein this also removes any contaminants. Selection of a particular acid would have been within purview of the skilled artisan; however, it would have been obvious to use HNO₃ because such is a known acid for chemically treating silicon-containing articles to produce silanol (Si-

OH) groups thereon, as taught by Plobl (p. 7, 1st paragraph; p. 28, section 5.2). It would have been obvious to heat the surfaces to less than 300°C during contacting because such is known in the art, as taught by Eda (column 16, lines 1-5), wherein this improves bonding between the same.

Regarding claim 18, it would have been obvious to apply pressure during contacting because this expedites the bonding process. Selection of a particular pressure would have been within purview of the skilled artisan.

This is a provisional obviousness-type double patenting rejection.

32. Claims 1-3, 11-13, and 15 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-4, 10, 20-22, 31, 33-34, 44, and 46 of copending Application No. 10/255,777 in view of Eda and Gwo.

With respect to claims 1 and 3, claims 1, 21, and 33 of the copending application teach all the limitations except the optical waveguide and optical article being silicon-containing. It would have been obvious to use an optical waveguide and an optical article containing silicon because such is known in the art, as taught by the collective teachings of Eda and Gwo (see paragraphs 12 and 18 above), wherein such materials lend themselves to direct bonding via chemical surface treatment.

As for alternatively providing an Si-OH termination group on the surfaces of the copending application, it would have been obvious to do so because such is known in the art, as taught by Gwo (see paragraph 12 above), wherein siloxane bridges (Si-O-Si) can be formed between the two surfaces during bonding.

Regarding claims 2 and 12, claims 1, 21, and 33 of the copending application teach heating to a temperature below 200°C during the contacting step. As for heating to a temperature greater than 200°C but less than 300°C, such would have been obvious since it is known in the art to do so, as taught by Eda and Gwo (see paragraphs 12 and 18 above).

Regarding claim 11, it would have been obvious to rinse the surfaces with water and contact them without drying because such is known in the art, as taught by Eda (column 15, lines 8-11), wherein this removes contaminants from the surfaces.

Regarding claim 13, claims 20, 31, and 46 of the copending application teach applying pressure during contacting but are silent as to how much. Selection of a particular pressure would have been within purview of the skilled artisan at the time the invention was made.

Regarding claim 15, claims 2-4, 10, 22, and 34 of the copending application teach all the limitations.

This is a provisional obviousness-type double patenting rejection.

33. Claims 16 and 18 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 18, 20, 44, and 46 of copending Application No. 10/255,777 in view of Eda, Landrock, and Pobl et al.

With respect to claim 16, claims 18 and 44 of the copending application teach all the limitations except the optical waveguide and optical article articles containing silicon, polishing, contacting with detergent, contacting with an aqueous rinse solution, the acid being HNO₃, and heating at a temperature greater than 200°C but less than 300°C.

It would have been obvious to the skilled artisan to use silicon-containing optical articles because such is known in the art, as taught by Eda (column 14, line 59-67; column 15, lines 13-

14). It would have been obvious to polish the articles because such a technique is well-known in the art for improving the appearance and performance of the finished product. It would have been obvious to contact the surfaces with a detergent because such is known in the art of chemically treating silicon-containing articles, as taught by Landrock (see paragraph 14 above), wherein such cleansing removes contaminants. It would have been obvious to contact the surfaces with an aqueous rinse (i.e. water) because such is known in the art, as taught by Eda (column 15, lines 8-11), wherein this also removes any contaminants. Selection of a particular acid would have been within purview of the skilled artisan; however, it would have been obvious to use HNO_3 because such is a known acid for chemically treating silicon-containing articles to produce silanol (Si-OH) groups thereon, as taught by Plobl (p. 7, 1st paragraph; p. 28, section 5.2). It would have been obvious to heat the surfaces to a temperature greater than 200°C but less than 300°C during contacting because such is known in the art, as taught by Eda (column 16, lines 1-5), wherein this improves bonding between the same.

Regarding claim 18, claims 20 and 46 of the copending application teach applying pressure during contacting but are silent as to how much. Selection of a particular pressure would have been within purview of the skilled artisan.

This is a provisional obviousness-type double patenting rejection.

34. Claims 1-3, 12-13, and 15 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 6-7, 11, and 26-27 of copending Application No. 10/232,193.

With respect to claim 1, claims 6 and 26 of the copending application encompass all the claimed limitations (skilled artisan would have appreciated that glass and optical fibers, which are made from glass, are silicon-containing material).

Regarding claims 2 and 12, claim 11 of the copending application encompasses this limitation.

Regarding claim 3, claims 7 and 27 of the copending application encompass this limitation.

Regarding claim 13, it would have been obvious to apply pressure during bonding because such is a known technique for expediting a bonding process. Selection of a particular pressure would have been within purview of the skilled artisan at the time the invention was made.

Regarding claim 15, claim 26 of the copending application teaches this limitation.

This is a provisional obviousness-type double patenting rejection.

35. Claims 16-18 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 18 and 28 of copending Application No. 10/232,193 in view of Landrock, Eda, and Plohl et al.

With respect to claim 16, claims 18 and 28 of the copending application teach all the limitations except polishing, contacting with detergent, contacting with an aqueous rinse solution, the acid being HNO_3 , and heating to a temperature less than 300°C .

It would have been obvious to polish the articles because such a technique is well-known in the art for improving the appearance and performance of the finished product. It would have been obvious to contact the surfaces with a detergent because such is known in the art of

chemically treating silicon-containing articles, as taught by Landrock (see paragraph 14 above), wherein such cleansing removes contaminants. It would have been obvious to contact the surfaces with an aqueous rinse (i.e. water) because such is known in the art of chemically treating the surfaces of optical articles to direct bond the same, as taught by Eda (column 15, lines 8-11), wherein this also removes any contaminants. Selection of a particular acid would have been within purview of the skilled artisan; however, it would have been obvious to use HNO_3 because such is a known acid for chemically treating silicon-containing articles to produce silanol (Si-OH) groups thereon, as taught by Plobl (p. 7, 1st paragraph; p. 28, section 5.2), wherein such groups allow for the formation of siloxane bridges during bonding. It would have been obvious to heat to less than 300°C during contacting because such is known in the art, as taught by Eda (column 16, lines 1-5), wherein this promotes bonding.

Regarding claim 18, it would have been obvious to apply pressure during contacting because this expedites the bonding process. Selection of a particular pressure would have been within purview of the skilled artisan.

This is a provisional obviousness-type double patenting rejection.

36. Claims 1-3, 12-13, and 15 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 6-7, 11, and 26-27 of copending Application No. 10/035,659.

With respect to claim 1, claims 6 and 26 of the copending application encompass all the claimed limitations (skilled artisan would have appreciated that glass and optical fibers, which are made from glass, are silicon-containing material).

Regarding claims 2 and 12, claim 11 of the copending application encompasses this limitation.

Regarding claim 3, claims 7 and 27 of the copending application encompass this limitation.

Regarding claim 13, it would have been obvious to apply pressure during bonding because such is a known technique for expediting a bonding process. Selection of a particular pressure would have been within purview of the skilled artisan at the time the invention was made.

Regarding claim 15, claim 26 of the copending application teaches this limitation.

This is a provisional obviousness-type double patenting rejection.

37. Claims 16 and 18 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 18 and 28 of copending Application No. 10/035,659 in view of Landrock, Eda, and Plobl et al.

With respect to claim 16, the claims of the copending application teach all the limitations except polishing, contacting with detergent, contacting with an aqueous rinse solution, the acid being HNO_3 , and heating to less than 300°C .

It would have been obvious to polish the articles because such a technique is well-known in the art for improving the appearance and performance of the finished product. It would have been obvious to contact the surfaces with a detergent because such is known in the art of chemically treating silicon-containing articles, as taught by Landrock (see paragraph 14 above), wherein such cleansing removes contaminants. It would have been obvious to contact the surfaces with an aqueous rinse (i.e. water) because such is known in the art of chemically

treating the surfaces of optical articles to direct bond the same, as taught by Eda, wherein this also removes any contaminants. Selection of a particular acid would have been within purview of the skilled artisan; however, it would have been obvious to use HNO_3 because such is a known acid for chemically treating silicon-containing articles to produce silanol (Si-OH) groups thereon, as taught by Plobl (p. 7, 1st paragraph; p. 28, section 5.2). It would have been obvious to heat to less than 300°C during contacting because such is known in the art, as taught by Eda (column 16, lines 1-5), wherein this promotes bonding.

Regarding claim 18, it would have been obvious to apply pressure during contacting because this expedites the bonding process. Selection of a particular pressure would have been within purview of the skilled artisan.

This is a provisional obviousness-type double patenting rejection.

Response to Arguments

38. On pages 4-10 of the arguments, Applicants argue that Eda fails to teach a solution having a "high pH". The examiner points out that Eda is no longer being used to reject this limitation.

39. On page 10 of the arguments, Applicants argue that the present application and copending application 10/255,926 are not conflicting because the present application recites an Si-OH group in addition to the other three groups wherein the copending application only recites the three groups.

The examiner respectfully points out that statutory double patenting exists between the three groups claimed in both the present application and the copending application ($-\text{Si}-(\text{OH})_2$,

-Si-(OH)₃, and -O-Si-(OH)₃ since Markush language only requires one of these groups to meet the claimed limitation. As for the Si-OH group, Applicants are invited to reread the obviousness double patenting rejection set forth in paragraph 24 above.

40. On page 11 of the arguments, Applicants argue that none of the claims in copending applications 10/255,777 and 10/035,358 teach silicon-containing articles.


The examiner invites Applicants to reread the obviousness-type double patenting rejections set forth in paragraphs 30 and 32 above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Jessica L. Rossi** whose telephone number is 571-272-1223. The examiner can normally be reached on M-F (8:00-5:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard D. Crispino can be reached on 571-272-1226. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.


Jessica L. Rossi
Patent Examiner
Art Unit 1733